ABSTRACT

A method wherein a thermal gradient over a substrate enhances Chemical Vapor Deposition (CVD) at low pressures. An upper heat source is positioned above the substrate and a lower heat source is positioned below the substrate. The upper and lower heat sources are operated to raise the substrate temperature to 400-700° and cause a heat gradient of 100-200° C between the upper and lower heat sources. This heat gradient causes an increase in the deposition rate for a given reactant gas flow rate and chamber pressure. The preferred parameters for implementation of the present invention for poly crystalline silicon deposition include the temperature of the upper heat source 100-200° C above the lower heat source, a substrate temperature in the range of 400-700° C, a reactant gas pressure between 250 and 1000 mTorr, and a gas flow rate of 200-800 sccm. The substrate is rotated, with 5 RPM being a typical rate. A deposition rate of 2000 angstroms per minute deposition of poly crystalline silicon is achieved with a 200° C temperature differential, substrate temperature of 650° C, pressure of 250 mTorr and silane flow of 500 sccm.